

IN THE CLAIMS:

Please amend the following claims:

- 1 1. (Currently Amended) A process for the wet fractionation of cereal bran components, wherein bran being the fibrous-residue resulting from a primary grain milling, i.e. after the separation of the endosperm fraction, of wheat, barley, oat, rye and triticale, and having a variable chemical composition, a presence of anti-nutritive factors, and various anatomical fractions, i.e. pericarp, germ, and residual endosperm is first subjected to a first combination of enzymatic treatment with utilizing a combination of enzymes of the group starch- and phytate-hydrolysing enzymes, and aqueous wet milling, followed by an optional step of enzyme inactivation by wet heat treatment, and a subsequent step whereby the resultant aqueous slurry/suspension is separated into an insoluble phase containing a cleaned bran consisting of both pericarp and aleurone fractions are fibrous fraction and a soluble fraction, and wherein said soluble fraction is further separated by centrifugal forces into an aqueous phase containing a germ-rich fraction and a further aqueous phase containing residual an endosperm components, and sugar-rich fraction, and that the proteins and sugars contained in the endosperm-rich fraction are concentrated separated, and;
- 15 said insoluble fibrous fraction containing a cleaned bran consisting of both insoluble pericap and aleurone fractions, is further hydrolysed by a second enzymatic treatment utilizing a combination of one or a mixture of enzymes of the group non-starch polysaccharidases, and aqueous wet-milling, followed by an optional step of enzyme inactivation by wet heat treatment, and a subsequent step whereby the resultant hydrolysate is separated into an insoluble phase and a soluble phase.

1 2. (Canceled)

1 3. (Currently Amended) A process according to claim 1, wherein the first enzymatic treatment
2 is accomplished using a starch degrading enzyme of the group of groups amylases and
3 amyloglucosidases.

1 4. (Currently Amended) A process according to claim 1, wherein a further the second
2 enzymatic treatment is carried out using at least one non-starch degrading polysaccharidase in
3 the form of cellulases, hemicellulases mainly xylanases, beta-glucanases, and pectinases, and/or
4 phytases.

1 5. (Canceled)

1 6. (Currently Amended) A process according to claim [[5]]1, wherein the inactivated insoluble
2 phase obtained from the hydrolysate is then fractionated by centrifugal forces into an insoluble
3 phase and containing primarily insoluble fibers, i.e. cellulose, lignin, less accessible
4 hemicellulose, residual aleurone cells and cell wall bound proteins is spray dried, and;
5 an-aqueous the soluble phase containing soluble hemicellulose, oligosaccharides, sugars and
6 proteins, and that the aqueous said soluble phase is further separated by centrifugal force into
7 protein rich fraction and a carbohydrate rich fraction, and that the carbohydrate rich fraction is
8 into a heavy phase containing mainly aleurone cell protein and a light phase containing
9 hemicellulose in the form of soluble hemicellulose and oligosaccharides, and;

10 said light phase is further separated by size exclusion technique into [[a]] soluble hemicellulose-
11 rich fraction (medium molecular size fraction) and an oligosaccharide rich fraction
12 oligosaccharides mixed with sugars (small molecular size fraction).

1 7. (Currently Amended) A process according to claim [[5]] 1, wherein cleaned bran cereal bran
2 substantially free of both in water or less polar solvents soluble compounds, [[are]] derived from
3 wheat, rice, barley, oat, rye or triticale.

1 8. (Previously Presented) A process according to claim 1, wherein the combination of
2 intermittent wet milling with enzymatic treatment is arranged to increase the rate of enzymatic
3 hydrolysis of the substrate thereby improving the overall hydrolysis performance and the
4 subsequent separation of the various fractions by density/solubility and molecular size.

1 9. (Canceled)

1 10. (Previously Presented) A process according to claim [[9]]4, wherein the enzymatic
2 treatment is accomplished by using xylanases with high beta 1-4- xylanase (pentosanase) and/or
3 beta-glucanase activity.

1 11. (Currently Amended) A protein fraction derived substantially from the germ germ-rich
2 fraction and produced according to claim 1, wherein [[the]] said fraction contains at least 35%
3 protein and 10% oil on dry matter basis and exhibits a high emulsifying capacity and an
4 increased shelf life with regards to resistance to oxidation compared to the original bran, and that

5 [[the]] said fraction contains less than 5% fibre.

1 12. (Currently Amended) A protein fraction derived substantially from the ~~residual endosperm~~
2 endosperm-rich fraction and produced according to claim 1, wherein [[the]] said fraction
3 contains at least 25% protein and 10% sugar and less than 3% oil and 3% fibre, and at least 25%
4 soluble high-molecular weight non-starch polysaccharides of the groups beta-glucans for barley
5 and oat and arabinoxylans for wheat, rice, rye and triticale.

1 13. (Currently Amended) A protein fraction according to claim 12, wherein liquid whey is
2 incorporated in to [[the]] said fraction at levels varying from 20 to 80% by weight on dry matter
3 basis, and that the final mixture is dried.

1 14. (Currently Amended) An insoluble fibre fibrous fraction produced according to claim 1,
2 wherein the said fraction consists of cell wall components of bran in an amount of at least 85%
3 and aleurone proteins in an amount of at least 10%, and is substantially free of gluten and starch,
4 and with has a high water holding capacity of at least 6g water/g dry product.

1 15. (Currently Amended) A sugar fraction derived substantially from the endosperm-rich
2 fraction produced according to claim 1, wherein the said fraction is originated primarily from the
3 residual separated from the endosperm using size exclusion techniques and it contains containing
4 more than 65% sugars, such as glucose, maltose and malto-triose on dry matter basis.

1 16. (Currently Amended) A protein fraction derived substantially from the aleurone ~~cells and~~

2 protein in the heavy phase produced according to claim 5, wherein [[the]] said fraction contains
3 at least 35% protein and 10% oil, less than 5% insoluble fibre on dry matter basis, is
4 substantially free of gluten and starch and with a high emulsifying capacity.

1 17. (Currently Amended) An insoluble fibre fraction produced according to claim 5, wherein
2 [[the]] said fraction consists primarily of cell wall components with a relative lower relatively
3 low hemicellulose content compared to the original cleaned cereal bran, said fraction being
4 substantially free of gluten and starch (<1% on dry matter basis) and with having a high water
5 holding capacity (>6g water/g dry product).

1 18. (Currently Amended) A soluble hemicellulose fraction produced according to claim 5,
2 wherein [[the]] said fraction consists primarily of medium molecular weight hemicellulose
3 preferably above 20kDa in an amount of at least 40% of the groups arabinoxylans from wheat,
4 rye, rice and triticale, and beta-glucans from oat and barley, which also contains proteins in an
5 amount of less than 10% and monosaccharides in an amount of less than 10%, and is
6 substantially free of gluten and starch in an amount of less than 1% on dry matter basis.

1 19. (Currently Amended) A soluble oligosaccharide fraction produced according to claim 5,
2 wherein [[the]] said fraction consists primarily of low molecular weight hemicellulose sub-units
3 of below about 20kDa in an amount of at least 40% of the groups arabinoxylans from wheat, rye,
4 rice and triticale, and beta-glucans from oat and barley, which also contains proteins in an
5 amount of less than 10%, monosaccharides in an amount of less than 20%, lignans and related
6 phenolics in an amount of less than 5%, and is substantially free of gluten and starch in an

7 amount of less than 1% on dry matter basis.

1 20. (Previously Presented) A protein fraction according to claim 11, wherein the oil can be
2 optionally removed by conventional organic solvent extraction or preferably by supercritical
3 carbon dioxide extraction to yield an oil fraction and a defatted protein fraction.

1 21. (Currently Amended) A protein fraction according to claim 16, wherein the oil optionally
2 can be optionally removed by conventional organic solvent extraction or preferably by
3 supercritical carbon dioxide extraction to yield an oil fraction and a defatted protein fraction.

1 22. (Previously Presented) An insoluble dietary fibre according to claim 14, used for recovery
2 of cellulose, hemicellulose, lignin and lignans.

1 23. (Currently Amended) A germ oil produced in accordance with claim [[1]]20 containing
2 sterols known to reduce the uptake of cholesterol in humans and intact vitamin E complex,
3 sterols, lecithins, phospholipids and glycolipids.

1 24. (Currently Amended) A defatted germ rich protein produced in accordance with claim
2 [[1]]20.

1 25. (Currently Amended) An aleurone-rich oil produced in accordance with claim [[1]]21.

1 26. (Currently Amended) A defatted aleurone-rich protein produced in accordance with claim

2 [[1]]21.

1 27. (Currently Amended) A protein fraction according to claim 11, wherein proteases are
2 incorporated in to [[the]] said fraction in wet state and at controlled temperature and pH
3 conditions, and the resulting protein hydrolysate has enhanced functionalities such as solubility,
4 emulsifying and foaming capacities.

1 28. (Currently Amended) In feed and food applications a protein fraction according to claim 11
2 such that other protein products from vegetable and animal sources and used as texturizers,
3 emulsifiers, fat binders or fat replacers are replaced.

1 29. (Canceled)

1 30. (Canceled)

1 31. (Currently Amended) The use of In feed and food applications, a protein fraction, as
2 described in according to claim 12, in food applications as a foam stabilising agent, whipping
3 agent, water binder, gelling agent, and as a dietary supplement rich in soluble dietary fibre (beta-
4 glucans and arabinoxylans) with associated gelling, whipping, emulsifying, water binding, foam
5 stabilizing properties and health benefits such as cholesterol-reducing effects of the beta-glucans
6 in foods such as baked products, processed meats, dairy products, soups and sauces, high protein
7 drinks and health drinks are increased.

1 32. (Canceled)

1 33. (Currently Amended) ~~The use of In feed and food applications~~ a fibre fraction, as described
2 ~~in according to~~ claim 14, ~~in feed and food applications to replace such that~~ other insoluble
3 fibrous products as a texturizing and water binding ~~additive additives~~ in processed foods
4 particularly meat products, ~~and-as-a-sourcee sources~~ of dietary fibre in breakfast cereals, baked
5 products and health products, ~~or as a raw material for further processing to extract remaining~~
6 ~~cellulose, hemicellulose, lignin and lignans are replaced.~~

1 34. (Currently Amended) ~~The use of a In feed and food applications~~, a soluble hemicellulose, as
2 ~~described in according to~~ claim 18, ~~in feed and food applications as a gellant, thickener, such that~~
3 ~~gelling, thickening, foam stabilizer stabilizing, emulsifier emulsifying, water binder binding,~~ and
4 ~~as a dietary supplement rich in soluble dietary fibre, and in chemical applications, or as a raw~~
5 ~~material for further processing to obtain other functional hemicelluloses gut-health beneficial~~
6 ~~properties in foods such as baked products, processed meats, dairy products, soups and sauces,~~
7 ~~high protein drinks and health drinks, and in chemical applications are increased.~~

1 35. (Canceled)

1 36. (Currently Amended) ~~The use of In food and feed application~~, a soluble oligosaccharide, as
2 ~~described in according to~~ claim 19, ~~in feed and food applications as a functional soluble dietary~~
3 ~~fibre or low calorie sweetener, or as a raw material for further processing to extract such that~~
4 ~~health beneficial properties from antioxidants, pentosans-lignans and associated phenolics such~~

5 as ferulic acid, or as a feedstock for industrial fermentation are increased.

1 37. (Currently Amended) The use of In confectionary formulations a soluble oligosaccharide, as
2 described in according to claim 19, in confectionery formulations in combination such that when
3 combined with glucose or other sugar syrups and further concentrated to produce a moisture
4 stable products product is produced.

1 38. (Currently Amended) The use of In food and biomedical applications a soluble
2 oligosaccharide, as described in according to claim 19, in food and biomedical applications as a
3 combined source such that the sources of lignans and fermentable oligosaccharides are combined
4 for the conversion of lignans into active cancer-reducing agents such as enterolactones.

1 39. (Canceled)

1 40. (Withdrawn) A set up for carrying out the process according to claim 1, wherein it
2 comprises a hydrolysis vessel, a wet mill, a heat exchange for enzymatic inactivation, decanters,
3 a holding tank, an ultra-filter, and optionally at least an evaporator, and dryers.

1 41. (Withdrawn) A set up for carrying out the process according to claim 5, wherein it
2 comprises a hydrolysis vessels, a wet mill, a heat exchange for enzymatic inactivation, decanters,
3 a holding tank, an ultra-filter, and optionally evaporators, and dryers.

1 42. (Currently Amended) A process according to claim 1, wherein the first enzymatic treatment

2 is carried out for less than 3 hours at a pH of 4 to 7.5 and at a temperature of from 50 to 90°C, at
3 an enzymatic activity of at least 1 IU/g of substrate, preferably 200 to 1500 IU/g of substrate.

1 43. (Currently Amended) A process according to claim [[5]] 1, wherein the second enzymatic
2 treatment is carried out for less than 3 hours at a pH of 4 to 7, preferably 4.5-5.5, and at a
3 temperature of from 35 to 80°C, at an enzymatic activity of at least 1 IU/g of substrate,
4 preferably 200 to 1500 IU/g of substrate.

1 44. (New) A protein fraction according to claim 10, wherein proteases are incorporated into said
2 fraction in a wet state and at controlled temperature and pH conditions, and the resulting protein
3 hydrolysate has enhanced functionalities such as solubility, emulsifying and foaming capacities.